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Gustavo Abel Guzman
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**ALTERNATIVE MANUFACTURING DEVELOPMENTS
FROM THE SEMI-PERIPHERY : THE CASE OF HUMAN-
CENTRED MANUFACTURING APPROACH IN BRAZIL**

**A thesis submitted in partial fulfilment of the
requirements for the award of the degree**

DOCTOR OF PHILOSOPHY

from

THE UNIVERSITY OF WOLLONGONG

by

Gustavo Abel Carrillo Guzman, BEng, MA

Science and Technology Studies

June, 1998

I declare that work presented in this dissertation is original, except where otherwise acknowledged.

June 1998

Gustavo A.C. Guzman

ABSTRACT

The key research question of this study is to determine if Brazilian firms are applying the human-centred manufacturing approaches and if so, to explore how and to what extent this is happening. From this, two related research topics emerge: (i) how macro contextual conditions support or constrain the implementation of the HC model; and (ii) which are the main technical and organisational features of a 'tropicalized' (adapted) HC model in Brazilian firms. In order to address these questions, case studies were carried out in 10 Brazilian firms. The aim of the empirical study was to determine the form and level of human-centredness in these firms and to explore the factors affecting this. An examination was then made of the patterns of human-centred development and its links with product, process and environmental factors, identified in the literature as key influences on HC systems developments. Two theoretical approaches were used to inform the empirical component of this study in order to explain the application of New Production Systems and, specifically the Human-centred approach in the semi-periphery. Firstly, the examination at the level of the firm, integrates constructivist views of people, technology and organisation with the concept of manufacturing engineering systems as well as the organisation configuration approach. This helps to understand "how" the human-centred approach was applied in Brazil. Secondly, a political economy examination of the macro contextual factors assisted to understand "why" related questions. Key findings of this study refer to the wide range of adaptation to local conditions of new production systems. This is explained by contextual institutional factors, such as industrial relations and regional labour markets. In contrast to established human-centred theory, the degree of human-centredness in the organisational arena was not strongly linked to either (i) human-centred designed technology; (ii) to new product market variety and change; or (iii) characteristics of the firm.

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CONTENTS

Exhibits	viii
Abbreviations	x

INTRODUCTION

Chapter 1	Introduction	1
	1.1 The research question and justification	3
	1.2 Human-centredness: a brief concept	7
	1.3 Challenges and opportunities of the HC theory	14
	1.4 Contents Outline	16

Chapter 2	Methodological Notes	20
	2.1 Research Strategy	21
	2.2 Research Logic	26
	2.3 The Underlying Assumptions of the present research	30
	2.4 Conclusions	42

PART I HCMS: THEORETICAL NOTES

Chapter 3	NPS in Perspective: Implications for the Human-centred Model	
3.1	Introduction	45
3.2	On Production Systems	46
3.3	Towards the Japanization of Swedish and German Production Systems?	51
3.4	Towards the Europeanization of Japanese Production System ?	55
3.5	Post-Lean Production : Japanese Production Organisation concepts with European "Humanization of Work" Spirit ?	60
3.6	New Production Systems in Perspective: Implications for the Human- Centred Model	63
Chapter 4	HCMS: A Firm Level Conceptualisation	
4.1	Introduction	65
4.2	Constructivist views of people, technology and organisation	66
4.3	The concept of Human-Centred Manufacturing Systems (HCMS)	70
4.4	Design and principles of HCMS	
4.4.1	HC technology design and principles	75
4.4.2	HC organisational design and principles	81
4.5	Implementation and configuration of HCMS	92
4.5.1	Technological and organisational aspects of the HC configuration	96
4.5.1.1	The technological configurational model	97
4.5.1.2	The organisational configurational model	99
4.6	The process of HC design and implementation	104
4.7	The strategic congruence between technological, organisational and product/market configurations	109
Chapter 5	HC Concepts: A Macro Level View	
5.1	Theoretical framework	112
5.2	Brazilian macro contextual conditions:	
	Implications for HC principles application	120
5.2.1	Macro institutional external conditions supporting and constraining HC principles application	120
5.2.2	Brazilian industrial development:	
	An historical overview	123
5.2.3	Indigenous technological capability	126
5.2.4	Scientific and technologic system of innovation	135
5.2.5	The educational and vocational training system	139
5.3	Conclusions: Macro institutional conditions supporting and constraining implementation and diffusion of HC principles	145

PART II HCMS IN BRAZIL: AN EXPLORATORY STUDY

Chapter 6	Introduction	151
	6.1 General features of researched firms	153
Chapter 7	The Horizontal Dimension	158
	7.1 The extent of horizontal cellularisation	159
	7.2 Product customisation feasibility and the horizontal dimension	159
	7.3 Cell type and the horizontal dimension	162
	7.4 Batch size and the horizontal dimension	166
Chapter 8	The Vertical Dimension	
	8.1 Introduction	168
	8.2 Direct manufacturing indicators	171
	8.3 Indirect manufacturing indicators	182
	8.4 Wider organisation structure indicators	188
Chapter 9	HCMS in Brazil: Scope of Restructuring	205
	9.1 A Shopfloor level examination	206
	9.2 A Firm level examination	210
	9.3 HC restructuring: A re-assessment	214
	9.4 Testing criteria for assessing Human-centredness	221
	9.5 General design orientations and productivity levels	224
	9.6 HCMS Under Different Product/market, Design and Manufacturing Strategies	
	9.6.1 Introduction	229
	9.6.2 Theoretical notes	229
	9.6.3 The empirical evidence	239
	9.6.4 Discussion	241
Chapter 10	Conclusions	
	10.1 Introduction	243
	10.2 Typology of Brazilian firms	244
	10.3 Variety of Configurations within HC-oriented firms	244
	10.4 Common elements of HC-oriented firms	245
	10.5 Evidence of weakness of general explanations of the HC development	247
	10.6 The persuasive influence of Brazilian national conditions	250
	10.7 Brazilian HC-oriented firms in perspective	254
	Appendix A: Questions for guiding interviews	260
	Bibliography	286

List of Exhibits

- 1.1 HCMS: A firms level outline
- 2.1 Number of persons formally interviewed
- 2.2 Four paradigms for the analysis of social theory
- 4.1 The shaping of manufacturing engineering systems
- 4.2 Manufacturing Engineering systems: a configurational processual approach
- 4.3 Comparison between ideal types of HC workgroups and non-HC workgroups
- 4.4 Technological manufacturing configuration model
- 4.5 Organisational manufacturing configuration model
- 4.6 Strategic congruence between technological, organisational and product/market configurations
- 5.1 HC concepts: the macro contextual view
- 5.2 World ranking of countries in terms of industrial activity
- 5.3 Classification of competitive and non-competitive industrial sectors
- 6.1 General features of researched firms
- 6.2 Firms output profile
- 7.1 The extent of horizontal cellularisation
- 7.2 Product customisation feasibility
- 7.3 Horizontal cellularisation and product customisation feasibility
- 7.4 Cell development stages
- 7.5 Horizontal cellularisation extent and cell type
- 7.6 Horizontal cellularisation extent and batch size
- 8.1a Key manufacturing organisational dimensions: A non-HC approach
- 8.1b Key manufacturing organisational dimensions: A HC approach
- 8.2 Manufacturing organisational structure index
- 8.3 Production order system index
- 8.4 Means of production control index
- 8.5 Responsibility for output index
- 8.6 Cell work organisation index
- 8.7 Detail scheduling index
- 8.8 Production follow up index
- 8.9 Direct manufacturing indicators
- 8.10a Direct manufacturing indicators: tayloristic types
- 8.10b Direct manufacturing indicators: low level of human-centredness
- 8.10c Direct manufacturing indicators: medium/high levels of human-centredness
- 8.11 Indirect manufacturing indicators
- 8.12a Indirect manufacturing indicators: tayloristic types
- 8.12b Indirect manufacturing indicators: low level of human-centredness
- 8.12c Indirect manufacturing indicators: medium/high levels of human-centredness
- 8.13 Organisational integration index
- 8.14 Hierarchical level index
- 8.15 Wider organisation structure index
- 8.16 Skill level index: empirical data
- 8.17 Reward system index
- 8.18 Reward system index: empirical data
- 8.19 Career path index
- 8.20 Career path index: empirical data

- 8.21 Training index
- 8.22 Participation index
- 8.23a Participation index-1: empirical data
- 8.23b Participation index-2: empirical data
- 8.23c Participation index: empirical data
- 8.24 Wider organisation structure indicators: Empirical Data
- 8.25 Wider organisational structure indicators: an aggregate examination
- 8.26 HC oriented firms at each indicator group
- 9.1 Comparative organisational strategies at shopfloor level
- 9.2 Comparative organisational strategies at firm level
- 9.3 Firms vertical restructuring: empirical data
- 9.4 Human centredness: inter-firm comparison
- 9.5 Human-centred oriented firm
- 9.6 Tayloristic oriented firms
- 9.7 Neo-tayloristic oriented firms
- 9.8 General design orientations and productivity levels
- 9.9 Product and market matrix
- 9.10 Product-market design profiles strategies
- 9.11 Product and market strategies: empirical evidence
- 10.1 General design orientation and the firms' features
- 10.2 General design orientation and production scale
- 10.3 General design orientation and production scope
- 10.4 General design orientation and product customisation feasibility

Abbreviations

AMT	Advanced manufacturing technology
APS	Anthropocentric production systems
BRITE	Basic research in industrial technologies for Europe
CAD	Computed-aided design
CAM	Computer-aided manufacturing
CIM	Computer integrated manufacturing
CLP	Capitalistic labour process
CNC	Computer numerical control
CPU	Central process unit
DQP	Diversified quality production
ESPRIT	European strategic program for research and development in information technology
EURAM	European research for advanced materials
HC	Human-centred
HCMS	Human-centred manufacturing systems
IBGE	Instituto Brasileiro de geografia e estatística
FAST	Forecasting and assessment in Science and Technology
FDI	Foreign direct investment
FMS	Flexible manufacturing system
GDP	Gross domestic product
GNP	Gross national product
GT	Group technology
ITC	Indigenous technological capability
ISI	Import substitution industrialisation
JIT	Just-in-time
MES	Manufacturing engineering systems
MNC	Multinational companies
NC	Numerical control
NCMT	Numerical control machine tool
NIC	Newly industrialised country
NPC	New production concepts
NSI	National systems of innovation
OEM	Original equipment manufacturer
PCF	Product customisation feasibility
PPC	Production planning and control
R & D	Research and development
SBIC	Study of the Brazilian industrial competitiveness
SENAI	Servico nacional de aprendizado industrial
SOE	State-owned enterprise
SPC	Statistical process control
STS	Science, Technology and Society
S & T	Science and technology
TNC	Transnational companies
TQM	Total quality management
TU	Trade union
UMIST	University of Manchester institute of science and technology
WIP	Work in-process